



**ENGINEERING OPERATIONS COMMITTEE
MEETING MINUTES
FEBRUARY 3, 1999 - 9:00 A.M.
C&T/SECONDARY CONFERENCE ROOM**

Present: C. T. Maki G. D. Taylor J. D. Culp
P. F. Miller J. D. O'Doherty T. E. Davies
J. W. Reincke T. Fort M. H. Frankhouse
S. Bower

Guest: C. Bleech A. Clover D. L. Smiley
V. Childers

OLD BUSINESS

1. Approval of the Minutes of the December 3, 1998, Meeting - C. T. Maki

Minutes of the December 3, 1998, meeting were approved as written.

2. SUPERPAVE Bituminous Mixture Usage on 1999 Projects - S. Bower/M. Frankhouse

Steve Bower will talk to the regions about putting the bituminous mixture usage into the scoping document. Bituminous Mixture Guidelines will be re-issued to designers for the 2000 program (attached).

3. 1999 Warranty Projects for SUPERPAVE Mixtures E10, E30 and E50 - J. D. Culp

The development of warranty specifications for bituminous mixtures continues with the proposal that all 1999 projects involving SUPERPAVE E10, E30, and E50 mixtures include a five year warranty on materials and workmanship.

ACTION: The proposed warranty for bituminous SUPERPAVE projects using E10, E30 and E50 mixtures is approved.

4. Paying Stockpiled Aggregates for Bituminous Mixtures (Industry Feedback on Issues - MAPA and MAA) - M. Frankhouse

The issues brought up at the December EOC meeting were sent to MAPA for review and comment. EOC was not convinced of the merits of paying for stockpiled aggregates and tabled the issue.

5. **Preventative Maintenance Guidelines - S. Bower**

The draft guidelines, dated February 2, 1999, were presented for comment. The guidelines recommend that preventive maintenance treatments only be applied to pavements with a remaining service life of three years or greater. Rehabilitation and reconstruction fixes should be applied to pavements with a remaining service life of two years or less. When the final preventive maintenance guidelines are distributed, a cover memo should clearly state the general categories and goals for overall program balance. The FHWA will review the guidelines in the coming weeks. The issue will be placed on the March 4, 1999, EOC agenda for final approval. Steve Bower will meet with FHWA, if necessary.

NEW BUSINESS

1. **Region Engineer Representative for 1999 - C. T. Maki**

Thom Davies has agreed to continue serving as the region engineer representative for the coming year.

2. **Truck Mounted Attenuator use Guideline - V. Childers**

The issue was tabled until the spring. Vic Childers will separate the use guidelines for construction and maintenance operations.

3. **Ride Quality Specification for Bituminous Overlay Projects - J. D. Culp/D. L. Smiley**

A department/MAPA task group was formed to address ongoing problems with ride quality on bituminous overlay projects. A handout presented six recommendations to enable improved ride quality on overlay projects. July 1999 is the target date for any changes to be implemented for inclusion in the 2000 program.

ACTION: Using the suggested recommendations, a task group subcommittee will revise the current ride quality special provision with a target date for completion by late June or early July.

4. **Filling Cracks in Concrete Pavements Using Maintenance Performance Guide 101000, "Joint and Crack Filling", Referred to as Drip and Chip - T. E. Davies**

Thom Davies gathered responses from the regions - no problems were cited. The Maintenance Division will proceed with issuance of the guide for "drip and chip" crack filling.

5. Bituminous Mixture Guidelines - M. Frankhouse

The proposed guidelines and the special provision for high stress bituminous mixtures address the 1997/98 flushing and rutting problems. Current mixture design and selection guidelines do not consider traffic behavior and contain outdated performance graded binder information. MAPA has given the guidelines extensive review and support. The guidelines will give better direction to designers and will be available for the 2000 program.

ACTION: The guidelines dated February 11, 1999, were approved. The Design Division will notify designers in Lansing and the regions of these changes, and update the Design Manual.

(Signed Copy on File at C&T/Secondary)
Jon W. Reincke, Secretary
Engineering Operations Committee

JWR:kat

Attachment

cc: EOC Members
Region Engineers

J. R. DeSana	R. J. Risser, Jr. (MCPA)	G. L. Mitchell	B. Richter
R. J. Lippert, Jr.	A. C. Milo (MRBA)	J. Ruszkowski	R. D. Till
D. L. Smiley	J. Becsey (MAPA)	C. Libiran	M. Frierson
M. Nystrom (AUC)	D. Hollingsworth (MCA)	G. J. Bukoski	C. W. Whiteside
M. Newman (MAA)	J. Steele (FHWA)	K. Rothwell	M. P. Krause
T. L. Nelson, Jr.			

BITUMINOUS MIXTURE SELECTION GUIDELINES

2-11-99

This guide is to aid in the selection of bituminous mixtures. It is the ultimate responsibility of the region soils/material's Engineer to provide appropriate bituminous mixture and thickness recommendations. Any questions regarding these guidelines should be addressed to either Gary Mayes, Bituminous Investigation and Mixture Design Engineer (517-322-5668), or Curtis Bleech, Pavement Design Engineer (517-373-7596).

Rehabilitation, Reconstruction & New Construction Projects

I. Mainline Paving

A. Mixture Selection

All mainline paving shall be composed of Superpave mixtures except for the Capital Preventive Maintenance Program (CPM). Other exceptions require the approval of the Bituminous Advisory Committee. Exception requests should go to Mike Frankhouse, Bituminous Engineer (517-322-5672).

Computed Design BESAL's (Bituminous Equivalent Single Axle Load) will be used to identify the appropriate Superpave mixture type.

<u>Superpave Mix Type</u>	<u>Design BESAL (millions)</u>
E03	Less than 0.3
E1	Between .3 and 1.0
E3	Between 1.0 and 3.0
E10	Between 3.0 and 10.0
E30	Between 10.0 and 30.0
E50	Between 30.0 and 100.0

Design BESAL's are calculated using the following information:

1. Commercial Traffic
2. Traffic Growth Rate
3. Lane Distribution
4. BESAL Axle Load Equivalency for Flexible Pavement's
5. Total accumulated BESAL'S for 20 years.

The method is explained in the "AASHTO Guide for Design of Pavement Structures" 1993. Design BESAL's should be requested from Dave Wresinski (517-373-9560). Curtis Bleech, Pavement Design Engineer, Design Division, (517-373-7596) can provide an approximate BESAL value. It is not necessary to show the design BESAL's on the design plans.

B. Superpave Mixture Number and Thickness

After mixture selection has been determined based on design BESAL's the mixture number for use in the various pavement courses can be determined. The mixture number will be 2, 3, 4 or 5 depending on the nominal maximum size aggregate. The nominal maximum size aggregate is defined as one sieve size larger than the first sieve to retain more than 10 percent. Three times the nominal maximum size aggregate is used to determine the minimum thickness. Five times the nominal maximum size aggregate is used to determine the maximum thickness. Following are the mixture numbers, minimum/maximum thickness and course application:

<u>Mixture #</u>	<u>Nominal Max. Size</u>	<u>Minimum Thickness</u>	<u>Maximum Thickness</u>	<u>Course Application</u>
2	25 mm	75 mm	125 mm	Base
3	19 mm	57 mm	95 mm	Base and/or Leveling
4	12.5 mm	38 mm	63 mm	Leveling and/or Top
5	9.5 mm	29 mm	48 mm	Top

NOTES:

1. Application rate: 2.4 kg/m² per 1mm thickness.
2. Pavement designs requiring greater thickness than the specified maximum will require multiple lifts.
3. Crush and Shape: Use a minimum of two lifts over crushed materials. A minimum of 50 mm for the first lift is required for construction purposes.
4. Rubblized Concrete: The first lift over the rubblized concrete will be a minimum of 50 mm. Additionally, traffic should not be allowed on the rubblized section until at least two courses have been placed (79 mm minimum).
5. The 4 mixture can be used as Top & Leveling on the same project.

The following is the Superpave definition for Top, Leveling and Base course. This definition should be referred to when making the asphalt binder and mixture selections: **The Top and Leveling courses are defined as the mixture layers within 100 mm of the surface; the base course is defined as all layers below 100 mm of the surface. For mixture layers which fall within the 100 mm threshold, the following rule should apply: If less than 25% of a mixture layer is within 100 mm of the surface, the mixture layer should be considered to be a base course.**

Below are examples of a Superpave Pay Items and descriptions:

Bituminous Mixture 3E10-	A leveling course with a minimum lift thickness of 57 mm on a project that has design BESAL's between 3 and 10 million
Bituminous Mixture 4E03-	A top or leveling course with a minimum lift thickness of 38 mm on a project that has design BESAL's less than 0.3 million

C. High Stress Bituminous Mixture

A new pay item has been created to address traffic areas such as signalized intersections. This new pay item is titled **High Stress Bituminous Mixture**. The difference between the High Stress Bituminous Mixture and the typical Superpave Bituminous pay item is the Performance Graded binder. The increase in the high temperature number results in an asphalt binder with improved high temperature stiffness or rutting resistance.

- a. Use this pay item 300 meters on either side of the center of signalized intersections where stop/start traffic will occur on the mainline (for quantity calculations use 325 meters).
- b. When there is less than 1600 meters between signalized intersections, use the High Stress Bituminous Mixture for the entire length between the intersections.

- c. All bituminous approaches that are adjacent to the High_Stress Bituminous Mixture areas should be specified using this pay item.
- d. On some projects it may be necessary to use the High Stress Bituminous Mixture on the entire project (top and leveling courses).

Below is an example of a Superpave Pay Item and description:

High Stress Bituminous Mixture 3E10 A leveling course at a signalized intersection on a project that has design BESAL's between 3 and 10 million and a binder grade one level higher on the high temperature parameter.

D. Asphalt Binder Selection

Below is the Asphalt Binder usage table for all Superpave mixtures and High Stress Bituminous Mixtures:

All Regions Except Metro

Mixture Type	Bituminous Mainline		High Stress Bituminous Mixture - Signalized intersections and other areas of stop/start traffic.	
E10, E30, E50	PG 64-28	Top & Leveling Course	PG 70-22	Top & Leveling Course
	PG 58-28	Base Course	PG 58-28	Base Course
E03, E1, E3	PG 58-28	Top, Leveling, & Base Course	PG 64-28 (1)	Top & Leveling Course
			PG 58-28	Base Course

(1) Use a PG58-28 for top, leveling, and base courses in the Superior region

Metro Region

Mixture Type	Bituminous Mainline	High Stress Bituminous Mixture - Signalized intersections and other areas of stop/start traffic.
E10, E30, E50	PG 64-22 Top, Leveling, & Base Course	PG 70-22 Top & Leveling Course PG 64-22 Base Course
E03, E1, E3	PG 58-22 Top, Leveling, & Base Course	PG 64-22 Top & Leveling Course PG 58-22 Base course

NOTE: There are cases where the signalized intersections are spaced 1600 meters or less over the entire length of the project. When this occurs, specify the High Stress Bituminous Mixture pay item for the entire length.

II. Non-Mainline Paving

Non-mainline mixture selection should be based on the following table.

Design BESAL's (millions) Mainline					
	Shoulders $\geq 2.4\text{m}$ All Courses (1) (3)		Ramps and Temp. Rd. All Courses (2) (5)		Approaches, wedging and Hand Patching (4) (6)
	Mixture Type	Application Rate	Mixture Type	Application Rate	mainline top course (5)
Less than or equal to 3.0	13A	90 kg/m ² to 140 kg/m ²	13A	90 kg/m ² to 140 kg/m ²	
Greater than 3.0	4C Top	90 kg/m ² to 140 kg/m ²	4C Top	90 kg/m ² to 140 kg/m ²	mainline top course (5)
	3C Level or Base	120 kg/m ² to 180 kg/m ²	3C Level or Base	120 kg/m ² to 180 kg/m ²	
	2C Base	180 kg/m ² to 270 kg/m ²	2C Base	180 kg/m ² to 270 kg/m ²	

NOTE:

- (1) For shoulders ≥ 2.4 m add the following note to the Bituminous Application Estimate Table: **For shoulders only the mix design and/or Job Mix Formula (JMF) target value for Air Voids is to be adjusted to 2.5%.** Shoulders < 2.4 m use the same Superpave mix type as the mainline because it is paved in the same operation as the mainline pavement.
- (2) There are cases where the mainline mixture may be used on the ramps. Example: Ramps with high traffic volume resulting in frequent periods of slow moving and standing load applications.
- (3) Use a PG58-28 binder for all Regions.
- (4) Shoulder or mainline mixtures may be used on driveways, low traffic volume approaches and Hand Patching.
- (5) Select the same asphalt binder as the Mainline Mixture.
- (6) If more than one mixture and/or binder combination is required for bituminous approach, it should be clearly shown in the Bituminous Application Estimate Table.

Capital Preventive Maintenance Projects (CPM)**Mainline and Non-Mainline Paving**

4. Selection is based on commercial ADT in one direction in the design lane (average the present and future 15 year commercial ADT). On multi lanes: Assume 90% commercial traffic is in the right (design) lane.
5. Bituminous application rates shown in the table below are the required minimum and maximum rates to be used for the specified mixes.

Mixture Selection and Application Rates

Com. ADT 0-250		Com. ADT 251-3500	Com. ADT >3500
13A 90 kg/m ² to 140 kg/m ²	36A 60 kg/m ² to 90 kg/m ²	4C 90 kg/m ² to 140 kg/m ²	Request Recommendations from the Bituminous Unit of C&T Division

NOTE: Application rate: 2.4 kg/m² per 1mm thickness.

NOTE: Use a PG58-28 asphalt binder in the Superior Region and a PG64-22 for all other Regions.